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Study on the Global Internet of Things Industry Based on Patent Analysis

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Abstract: Based on incoPat, this article conducts patent analysis from patent applications, IPC technical field distribution, the main research institutions of the Internet of Things to reveal the development trend, technical hotspots, leading enterprises, technology leaders, also maps current technology patents, and access to essential strategic information and innovation. The results put forward suggestions on development and utilization of the Internet of Things.
Keywords: Internet of Things ; patent analysis ; incoPat

Introduction

The concept of Internet of Things (IOT) was first proposed by Professor Ashton of the Auto-ID Center of MIT in 1999 when he studied RFID. The Internet of things is the Internet of things. ITU defines the Internet of Things as "the Internet of Things (IOT) is a new form of communication between people and things, between things and things, which extends the communication from short-distance mobile transceivers to long-distance devices and daily necessities". There are many new technologies involved in the Internet of Things. The key technologies include radio frequency identification technology, sensor network technology, M2M technology and integration technology. In the 12th Five-Year Plan, Internet of Things (IOT), as an important part of the new generation of information technology, has been listed as a strategic emerging industry that the state has focused on cultivating, which marks that the IOT has formally entered the national strategic level of China.

Patent literature, which integrates technical, legal and economic information, is an important source of access to the latest global technological information. According to the statistics of the World Intellectual Property Organization, 95% of new technologies and inventions are recorded in patent literature, and about 80% of technical information only appears in patent literature. The number and development trend of patents can reflect the latest development trend of science and technology in a country (region).

Data Sources and Patent Search

Data Sources

IncoPat patent database contains more than 100 million patent information from 102 countries or organizations and regions in the world. It integrates many functional modules such as patent retrieval, analysis, data download, file management and user management. It also specially collects and processes patent data information from more than 20 major countries. The data fields are more perfect and the data quality is better. The amount is higher. Therefore, incoPat is chosen as the data source, and the patent information data is obtained in incoPat patent database by combining the key words of Internet of Things technology with the logical relational words of patent database.

Due to the fact that the patent entry into the database has been delayed for about three years from application to authorization, only the data before 2015 are used as research samples.

Patent search expression

According to the key words of Internet of Things technology and the logical relation words to be used, a patent search formula is established. A total of 118586 patents are searched. The following is the final patent search expression:

(AD=[19850101 to 20151231]) AND (TI = Internet of Things or TIAB = wireless sensor or TI = two-dimensional code or TI= (RFID) OR TI= (Radio Frequency Identification) or (FULL= (Internet of

Things) and TIAB= (Sensor)) or (TIAB= (Heterogeneous Network and Fusion) or TIAB=Heterogeneous Network Fusion or TIAB=IMS or TIAB=Cooperative Transport or TIAB=Flow Control Transport or TIAB=SCTP or TIAB=Mobile Tube Rational or TIAB = SON or TIAB = automatic PCI configuration or TIAB = mobile load balancing or TIAB = random access channel or TIAB = return technology or TIAB = heterogeneous network collaboration) AND (FULL= (Internet of Things) or FULL= (Wireless Sensor) or (TI= (Internet of Things AND security) or TI= (Internet of Things AND key) or TI= (Internet of Things and Wireless Networks) Digital Signature) or TI= (Internet of Things AND Authentication) or TI= (Internet of Things AND Fault Tolerance) or TI= (Internet of Things AND Privacy) or TI= (Internet of Things AND Anonymity) or TI= (Internet of Things AND Signature) or TI= (Sensor AND Security) or TI= (Sensor AND Key) or TI= (Sensor AND Encryption)))

Patent analysis of the global Internet of things industry

Annual distribution of patent applications

Technology life cycle theory divides technology growth into four stages: germination stage, growth stage, maturity stage and saturation stage. These four stages are graphically represented as S-shaped curves, which are also called "growth curves" because they resemble human life cycles.

This paper makes a statistical analysis of the number of patent applications for the Internet of Things in the world. The patent applications for the Internet of Things in the world are divided into three stages.

The first stage is the embryonic stage of 1985-1991 years. The average annual application volume is less than 150, and the total number of patents in the global Internet of things industry is very small.

The second stage is the low speed development period of 1992-2003 years. In 1999, Professor Ashton of MIT Auto-ID Center proposed the concept of Internet of Things for the first time at the International Conference on Mobile Computing and Networking held in the United States. This proposal also further promoted the increase in the number of patent applications for the Internet of Things worldwide, but the growth rate was slow.

The third stage is the high-speed development period after 2004. On November 17, 2005, the International Telecommunication Union (ITU) issued ITU Internet Speech 2005: Internet of Things. At the World Summit on the Information Society (WSIS) held in Tunisia, the concept of "Internet of Things" was formally put forward and the "Internet of Things" era was proudly and enthusiastically pointed out. With the deepening of the concept of the Internet of Things in people's minds, the number of patent applications for the Internet of Things is also increasing rapidly, ushering in a high-speed rise in the number of patent applications for the Internet of Things.

Patent analysis of Internet of things technology

According to IPC classification number (sub-category), the top ten Internet of Things technologies are counted, among which G06K (data recognition; data representation; record carrier; record carrier processing) accounts for 32 704 items, far more than other technologies; the second is H04W (wireless communication network); H04L (transmission of digital information, such as typing). Machine, image telegraphy, general coding, telephone telegraph communication equipment, etc. third.

Patent applicant analysis

Through statistical analysis of patent applicants in the global Internet of Things industry, leading enterprises in the Internet of Things industry can be excavated. The top two are Korean companies. The first is SAMSUNG ELECTRONICS CO Ltd., the second is Korea ELECTRONICS and TELECOMMUNICATIONS RESEARCH INSTITUTE, and the third is Germany GOEBEL PORZELLAN GMBH. We have more than 1000 patent applications. In China, only Zte Corp enter the top ten. Thus, in the United States, Germany, Korea and other countries, patent applications are concentrated, that is, foreign enterprises have a high concentration of patent applications, leading enterprises have obvious advantages.

Global geographical analysis

The top 10 countries and regions in the world are China, the United States, Korea, Germany, the World Intellectual Property Organization, Japan, the European Patent Office, Taiwan, the United Kingdom, Canada and Australia.

China has become the world's largest number of patent applications for the Internet of Things, more than a third of the global total, and the United States ranks second only half of China's number. According to the statistics of the World Intellectual Property Organization (WIPO), before 2010, patent applications for the Internet of Things ranked first among the United States, Germany and Japan. The surge of related patents in China in recent years shows that China has greatly increased its attention to the research and development of the Internet of Things industry, listing the Internet of Things industry as a new strategic industry in the country, and arousing the Internet of Things. The innovation enthusiasm of innovation entities such as network enterprises, universities and research institutes.

Suggestions and Countermeasures

Government should increase support.

From the development trend of the number of patent applications of Internet of Things, we can find that a small number of patents of Internet of Things began to appear in 1985, and increased rapidly in 1999, showing a steady trend in recent years. This trend also shows that the development of the Internet of Things industry is in a period of steady growth, and it has great space to play in the future. It is suggested that relevant government departments increase their investment in research and development funds of the Internet of Things industry to create a good environment for the development of the Internet of Things industry. It is suggested that scientific research institutions and enterprises in China join hands to integrate resources and actively tackle key technologies of the Internet of Things.

Enterprises should increase innovation.

The comprehensive strength of a country depends on the progress of science and technology and the all-round development of the economy. So for the Internet of Things industry, it needs to involve in a number of core technology areas, in the key technology areas of the Internet of Things industry must be pioneered and made some achievements, so that the country's Internet of Things industry will be more competitive. For Internet of Things (IOT) enterprises, tree industry specializes in the research and development of core competitive technology. On this basis, it invents and develops related technologies. It is suggested that China's IOT enterprises seize the opportunity, conform to the trend of the times, increase innovation and innovate in the competition.

Scientific and effective management of patents.

South Korea's technology development started late, but it developed very fast, especially in the field of electronic technology. On the one hand, in the course of the development of science and technology, Korea attaches great importance to the protection of intellectual property rights, and implements the strategy of patent application and rights protection. In addition, while attaching importance to the technological development and innovation of major enterprises, Korea also supports the technological development of small and medium-sized enterprises in Korea. On this basis, we should strengthen the construction of patent management institutions, improve the level of patent management, and actively serve Korean enterprises. On the other hand, in 2015, Korea formulated the "Dade Research and Development Special Zone" plan, introducing 3,000 sophisticated technology enterprises and 20 foreign research and development centers, making the Dade Research and Development Special Zone an important base for South Korea's patent output. This is also an important reason for the increase in the number of Korean patent applications.

Faced with this situation, the state should strengthen the scientific and effective management of patents, improve the awareness of intellectual property protection of the whole people, and promote the healthy development of the Internet of Things industry.

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